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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/601,301	06/13/2003	Seiji Sarayama	2271/62289-Z	5867
7590 12/15/2005				
RICHARD F. JAWORSKI Cooper & Dunham LLP 1185 Avenue of the Americas New York, NY 10036		EXAMINER HO, TU TU V		
		ART UNIT PAPER NUMBER 2818		

DATE MAILED: 12/15/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

10/601,301

Applicant(s)

SARAYAMA ET AL.

Examiner

Tu-Tu Ho

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 30 November 2005.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 94-97 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 96 and 97 is/are allowed.
- 6) ☒ Claim(s) 94 and 95 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 14 October 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☒ Certified copies of the priority documents have been received in Application No. 09/590,063.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |   |   |
|---|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)                        | 4) <input type="checkbox"/> Interview Summary (PTO-413)                     |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)    | Paper No(s)/Mail Date. _____  |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date _____   | 6) <input type="checkbox"/> Other: _____                                    |

### **DETAILED ACTION**

1. Applicant's Amendment filed 11/30/2005 has been reviewed and placed of record in the file.

#### ***Election/Restrictions***

2. By Entering the Amendment filed 11/30/2005, nonelected Inventions II and III as indicated in the Election filed 12/27/2004 in response to the Restriction Requirement mailed 11/24/2004 are under examination, and as such, the Restriction Requirement mailed 11/24/2004 is effectively withdrawn.

3. Applicant's arguments with respect to new claims 94-95, filed 11/30/2005, have been considered but they are moot in view of new ground(s) of rejection.

#### ***Claim Rejections - 35 USC § 102***

The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

4. **Claims 94-95** are rejected under 35 U.S.C. 102(b) as being anticipated by DiSalvo U.S. Patent 5,868,837 (cited in the parent application).

DiSalvo discloses a process for forming a slab of GaN single crystal as claimed (columns 4-5, particularly column 4, EXAMPLE II), and further teaches that the slab of GaN single crystal is to be used as a bulk crystal substrate of GaN upon which optical semiconductor devices, such

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as light emitting diodes, are epitaxially grown (columns 1 and 2, particularly column 1, lines 18-22, and column 2, lines 50-57, and most pertinently “GaN single crystals are expected to be ideal substrates for homoepitaxial GaN film growth”).

Specifically, referring to **claim 94**, DiSalvo discloses an optical semiconductor device comprising:

a bulk crystal substrate of GaN;

lower and upper cladding layers formed epitaxially on said bulk crystal substrate of GaN;

and

an active layer formed epitaxially between said lower and upper cladding layers (at the time the invention was made, a semiconductor light emitting device inherently comprises lower and upper cladding layers sandwiching an active layer, for example, the device depicted in Fig. 1 of the present invention),

said bulk crystal substrate of GaN comprising a slab of GaN single crystal produced by a process comprising the steps of:

forming a molten flux of a volatile metal element (sodium metal, column 4, lines 20-35) in a pressurized reaction vessel confining therein said molten flux together with an atmosphere containing N (nitrogen), such that said molten flux includes Ga in addition to said volatile metal element (column 4, EXAMPLE II, particularly “the nitrogen pressure in the autoclave was increased to 1,000 psi”);

growing GaN in the form of a single crystal body in said molten flux; and

supplying a compound containing N directly into the atmosphere in said reaction vessel from a source located outside said reaction vessel (column 4, lines 31-52, particularly: “The autoclave was sealed, inserted into a furnace, and attached to a nitrogen line”).

Referring to **claim 95**, as the DiSalvo’s process for forming the bulk crystal substrate of the slab of GaN is about the same as that as claimed, particularly the pressurized N-containing atmospheric condition, said DiSalvo’s GaN single crystal slab should also have a stoichiometric composition in the thickness direction thereof as claimed.

**5. Claims 94-95** are rejected under 35 U.S.C. 102(e) as being anticipated by Shibata et al. U.S. Patent 6,270,569 (cited in the parent application).

Shibata discloses a process for forming a slab of GaN single crystal (Embodiments 2 and 7, columns 9 and 11-12), and further teaches that the slab of GaN single crystal is to be used as a bulk crystal substrate of GaN upon which optical semiconductor devices, such as a blue laser diode or the like, are grown (column 1, lines 20-26). Shibata further teaches that a heated flux including Ga and Na, which is a volatile metal, is to be utilized (column 5, lines 45-50). Shibata further discloses that the process is performed under a pressured (“high-pressure”) atmospheric including nitrogen (column 12, first paragraph).

Specifically, referring to **claim 94**, Shibata discloses an optical semiconductor device comprising:

a bulk crystal substrate of GaN;

lower and upper cladding layers formed epitaxially on said bulk crystal substrate of GaN;

and

an active layer formed epitaxially between said lower and upper cladding layers (at the time the invention was made, a semiconductor blue laser diode or the like inherently comprises lower and upper cladding layers sandwiching an active layer),

said bulk crystal substrate of GaN comprising a slab of GaN single crystal produced by a process comprising the steps of:

forming a molten flux of a volatile metal element (Na, as noted above) in a pressurized reaction vessel (as detailed above) confining therein said molten flux together with an atmosphere containing N (nitrogen) (as noted above), such that said molten flux includes Ga in addition to said volatile metal element;

growing GaN in the form of a single crystal body in said molten flux; and

supplying a compound containing N directly into the atmosphere in said reaction vessel from a source located outside said reaction vessel (Fig. 2).

Referring to **claim 95**, as the Shibata's process for forming the bulk crystal substrate of the slab of GaN is about the same as that as claimed, particularly the pressurized N-containing atmospheric condition, said Shibata's GaN single crystal slab should also have a stoichiometric composition in the thickness direction thereof as claimed.

***Allowable Subject Matter***

6. Claims 96-97 are allowable over the prior art of record.

The following is an examiner's statement of reasons for allowance: The prior art of record fails to teach or render obvious an electron device with all limitations as recited in claim 96, comprising a bulk crystal substrate of GaN, a channel layer formed epitaxially on said bulk

crystal substrate of GaN, a gate electrode on the channel layer, source and drain electrodes provided on the channel layer at respective sides of the gate electrode, characterized in that said bulk crystal substrate of GaN comprising said slab of GaN single crystal is produced by said process comprising said steps as detailed in the claim, and in that all properties and characteristics of said bulk crystal substrate of GaN comprising said slab of GaN single crystal so produced have been fully considered as allowable by laws and as detailed in the specification and throughout the prosecution history of the present application.

### ***Conclusion***

7. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office Action. See MPEP § 706.07(a).

**THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

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8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Tu-Tu Ho whose telephone number is (571) 272-1778. The examiner can normally be reached on 6:30 am - 5:00 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, DAVID NELMS can be reached on (571) 272-1787. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Tu-Tu Ho  
December 09, 2005